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NEW METHODS OF GRAFTING AND BUDDING VINES

By E. H. TWIGHT.



Riparia Gloire de Montpellier.
Rupestris St. George.

Solonis.

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NEW METHODS OF GRAFTING AND BUDDING APPLIED TO THE RE-ESTABLISHMENT OF VINEYARDS WITH AMERICAN VINES.

When two branches or stems of closely related plants, growing side by side in a forest, overlap and touch each other, the bark becomes bruised and abraded. In such cases the sap exuding from the alburnum frequently produces a pad or callus by which incorporation or knitting takes place and the parts become one. From this observation the idea of creating artificial wounds to obtain a graft probably originated.

Grafting above ground was a common practice in the vineyards of the Romans, and their authors describe them carefully, while they hardly mention the underground graft. But for some reason, until recently most of these grafts tried upon the vines in modern times have failed. In the last ten years persistent efforts and successful experimentation in Europe have brought the discovery of new processes that have been very successful, and their use tends to become widely spread, though a few years ago the best authorities on viticulture condemned them.

Green Cleft Graft.

This graft is used a great deal in Hungary; it is an ordinary cleft graft made on the green shoots of very young vines. The shoot used as stock is cut between the second and third leaves (*A-A*) counting from the apex, and one and one-half to two inches above the third leaf. The latter is pinched at *B-B*. The scion is a similar shoot, the leaves of which are pinched. The ligature used is wool or raffia, and must be removed as soon as it begins to cramp the joint. This graft necessitates the decapitation of the stock, and is exposed to drying; and though used successfully on some vineyards of Hungary, it might not do as well in our drier climate.

Horwath Graft.

The Horwath graft (Fig. 2) consists in inserting a scion bud in the place of an eye of the stock; it is commonly used on fruit trees, but the excision of the bud on a vine cannot be done in the same way, because of the considerable protuberance existing at each node. The following method was adopted by Horwath:



FIG. 1.
GREEN CLEFT GRAFT.



FIG. 2.
HORWATH GRAFT.

A circular incision, penetrating the whole depth of the bark, is made $\frac{1}{3}$ -inch above and another the same distance below the bud (*a, b*); then on the right and left of the bud two longitudinal parallel incisions are made, joining the annular incisions. The bud thus prepared (*c*) should be placed on a shoot of as nearly as possible the same diameter as that from which it was taken. But the indispensable point, which marks the difference between ordinary budding and Professor Horwath's method, is that the bud must be placed or inserted in place of another bud on a node.

The green shoot to be used as stock having been chosen, and on the latter the bud where the graft is to be made determined, the leaf on that node is removed (*e*). Two semi-annular incisions are made (*a', b'*) at the same distances as on the scion, and a single longitudinal cut is made passing through the bark, dividing the petiole in two and joining the annular incisions. Then with the spatula of the grafting knife the bark is lifted on both sides so as to form two flaps, as in ordinary budding. The flaps being open, the scion is inserted (*d*), the flaps brought over it and the joint ligated. A fortnight or twenty days after, this is cut off. This graft has given good results, but is a lengthy and delicate operation.

Salgues Graft.

The Salgues graft (Figs. 3 and 4) consists of fixing on a green shoot of the year an elliptic scion or shield carrying a bud at its center. It is budding, but so modified as to be considered a new method; the grafts obtained are perfect and the joints invisible except for a slight swelling.

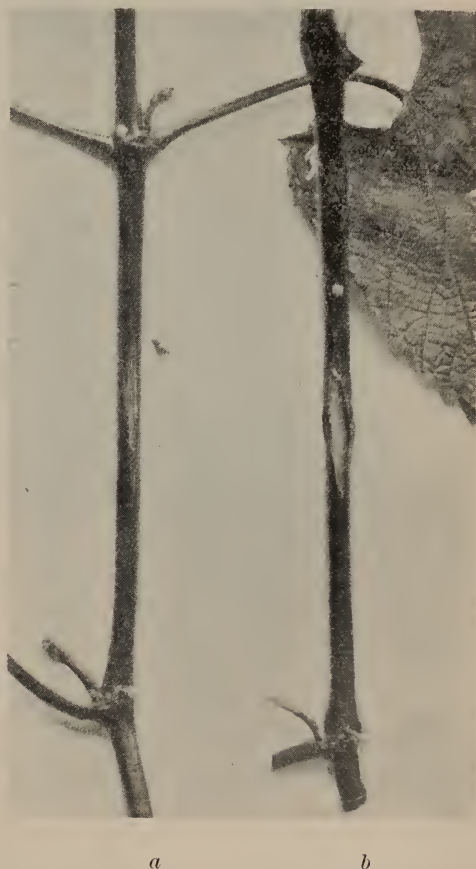


FIG. 3.

SALGUES GRAFT. (*Original.*)

On any internode of the shoot to be grafted a longitudinal incision (Fig. 3, *a*) is made with the grafting knife, penetrating the whole depth of the bark and about the length of the shield; with the haft of the grafting knife the bark is raised on both sides of the slit; the shoot is then bent inwards and the lips of the slit open easily (Fig. 3, *b*). The scion bud is inserted and the shoot is left to spring up into its former position. The scion bud is then compressed by the bark, and the operation is completed by tying. The ligature should be removed a fortnight or twenty days afterwards.



FIG. 4.

SALGUES GRAFT. VIEWS OF SCION BUD—(*a*) SIDE, (*b*) FRONT, (*c*) BACK.

In order that the Salgues graft may be a success, it is necessary, first, that the stock should be in full sap, so that the lips of the slit may be easily raised; secondly, that the scion bud should be carefully selected.

When a green shoot is cut longitudinally on its entire length, different colorations may be noticed along the section; towards the apex the shoot has not yet begun to lignify, and the section is almost uniformly green in color, only slightly deeper above and below each node. The diaphragm of these can only be detected at the second or

third node (counting from the top) by a slightly lighter color. Downwards the diaphragm becomes more distinct; finally, still lower, the pith begins to be indicated by a whitish tint; the scion bud should be taken only from the buds in which the diaphragm is already well apparent, but on the part of the shoot where the white pith is not noticeable. Each shoot will thus give two or three good eyes.

In practice, when one tries to bend a young vine-shoot there is no resistance at the top; then lower down it resists, and still lower down it does not bend but breaks. When the fingers can easily bend the shoot and feel a slight resistance, one is sure that the bud in that region, together with the one above and the one below, are suitable for budding. It is necessary to tie the grafted shoots to a stake, as they are thus better protected and do not dry out as easily as when close to the ground. This graft is simple, gives perfect union, and is getting to be very generally used. It is of great value in reëstablishing vineyards on resistant stock.

The Salgues graft may be performed on mother stocks of American vines through the summer as shoots develop; one can bud sixteen inches apart on the canes with the object of obtaining grafted cuttings for the next season. We have seen contracts given out for this work for \$6 a 1000 knitted grafts.

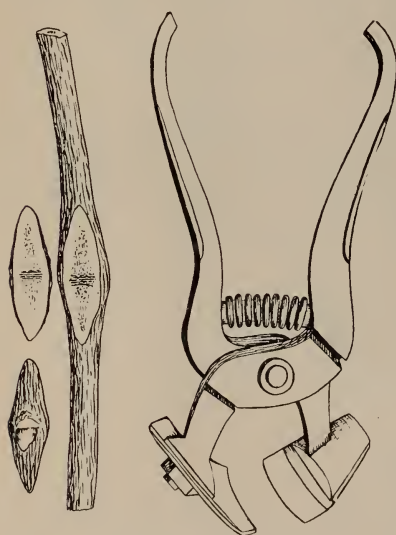


FIG. 5.
BESSON GRAFT.
(*Rev. de Vit.*, 1894.)

Besson Graft.

As stated above, the Salgues scion-bud is grafted on the internode of the shoot. The Besson graft (Fig. 5) like that of Horwath, is inserted on the node itself; but while the method of the Hungarian viticulturist is a true budding, that of Besson is an inlaying.

This graft is made in spring, at the same time as the ordinary bench graft. A special pair of shears is used, with curved blades perpendicular to the handle; it cuts and lifts the bud, the same operation being made on the stock and scion canes. The lateral portion detached must be a little under one-half of the thickness of the shoot; the cut is regularly curved and concave, and about one inch long.

On the stock, the second eye, counting from the top of the cutting, is cut out; while for the scion any one of the eyes on the cane is used. The scion-bud fits perfectly, as it is the same blade that makes the two cuts. The cuttings to be grafted should be sixteen inches in length their top being limited by a bud cut half-way through. The graft is tied with raffia, as in other bench grafts. So far, this graft tried on green shoots has not been a success, but on the ripe canes the results have been very good and the quality of the knitting is specially good.

Clarac Graft.

In the Clarac graft (Figs. 6 and 7), as in the Besson graft, a bud is substituted for another bud, but the process differs in many points. To prepare the stock an incision is made an eighth of an inch above a bud (Fig. 6, *a*) and the incision is continued in a straight section parallel to the axis of the cane, penetrating one-third of the diameter; the cut is stopped when the length is a little over the width of the blade

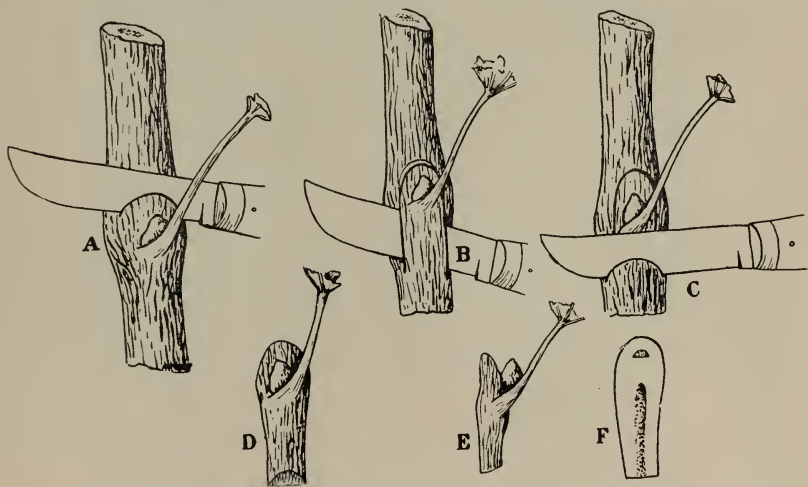


FIG. 6.
CLARAC GRAFT.

under the the base of the bud (Fig. 6, *b*). The blade is removed, laid flat on the cane immediately under the base of the bud, in order to indicate by the width of the blade the point where the new transverse and oblique incision is to be made, to prevent the first section from spreading and to make a strong notch for the scion to rest upon (Fig. 6, *c*).

The scion-bud is obtained in the same way, placed on the stock and tied.

Another way of making the Clarac graft consists in not removing the bud on the stock, only the longitudinal cut being made. The scion-bud is made in the same way but with a longer bevel; it is inserted in the slit prepared on the stock and tied. The bud left on the stock constitutes a sap drawer, which facilitates the knitting of the scion-bud. When knitting has taken place the stock bud is removed.



FIG. 7.

CLARAC GRAFT: METHOD WHERE BUD IS LEFT ON STOCK.

(R. de Vit., 1894.)

The second method is more rapid. In both cases the ligature must be cut away three weeks after being made. Both methods have been successful.

Massabie Graft.

This is practically the same as the Besson graft, but the scion-bud is cut with a special pair of shears.

Vouzou Graft.

The Vouzou graft (Figs. 8 and 9) is a Salgues graft made with an old scion-bud. On a smooth part of the stock above ground a T-shaped incision is made through the bark, and the sides are raised with the haft of the grafting knife.

The scion is taken from a cane of the previous year's growth before the eyes start to burst in the spring, and preserved in sand until the time of grafting. The bud should be well constituted and healthy, but need not be at a particular state of development, as in the Salgues graft. The scion-bud is cut out as is done for fruit trees, but under the eye a thickness of wood is left reaching to the pith; and even a little of the latter may be left. This will give a scion about one inch long, with the inside section nearly flat. The bud is inserted and tied in the usual way. To insure knitting the shoots of the stock must be pinched short; the tie is cut one month after.

This graft may be made during the whole period during which the sap is circulating, and when the bark is detachable from the wood. The Vouzou graft has been very successful; 75 to 85 per cent. of "takes" have commonly been obtained, and in one instance the success of 95 per cent was publicly demonstrated. It is a simple graft

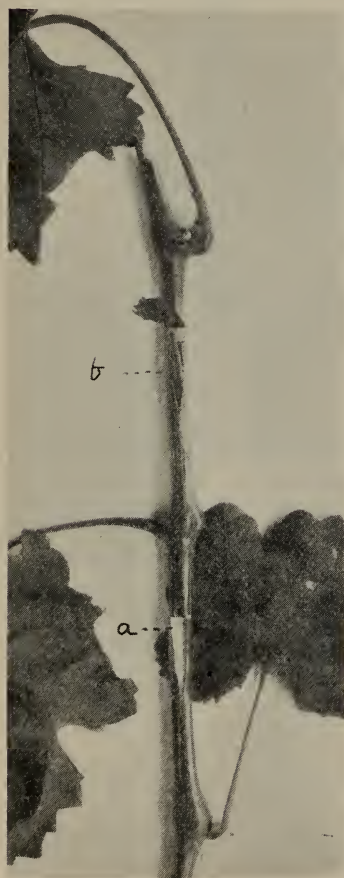


FIG. 8.

AN ORDINARY METHOD OF BUD-DING ON A VINE CANE. (a) SLIT BEFORE BUD IS INSERTED, (b) SAME AFTER INSERTION OF SCION-BUD. (*Original.*)

and gives a perfect union. In case of failure it is easy to repeat it the same season.

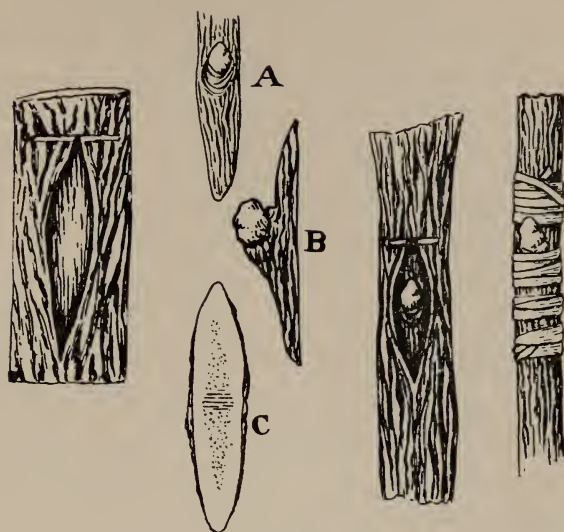


FIG. 9.

SAME AS 8 MAGNIFIED. THE TYING OF BUDS HAS BEEN MADE
WITHOUT USING THE FOIL.
(*Rev. de Vit.*, 1895.)

MEANS OF INSURING THE SUCCESS OF HERBACEOUS GRAFTS.

Selection of shoots bearing buds for scions.—We should always choose branches growing from eyes which would have normally remained dormant till the following season, in preference to branches growing from buds bursting out normally. Shoots of medium or rather small diameter are to be preferred. These shoots will furnish the scion-buds which are to be grafted on the old wood. The diameter of the shoot from which the scion-bud is cut must always be a little smaller than the diameter of those upon which it is to be grafted. The best shoot is that developed in the shade; branches exposed to direct sunlight must always be rejected; the shoot should be light green in color, but not yellow.

The petioles of the leaves of the shoot should be of a whitish-green color, even a little pinkish, slightly transparent at the point of junction with the limb. Shoots bearing leaves with deep green or reddish petioles should be rejected. The eyes of the extremity and base of the shoots, together with those placed at the base of the leaves having a very slender or very long petiole should not be used.

Preparation of Scion-Buds.

The whole of the petiole and part of the limb of the leaf should be left when the leaf is pinched; if the petiole is cut shorter the bud dries out. The same bud may be made with sap-wood or with half sap-wood, the latter is by far the best.

Scion with Sap-wood.—(*a, b, c*, Fig. 9; *a, b, c*, Fig. 4). To cut out the shields, the shoot is held with the left hand, the first finger being under the bud; the cut is begun with the base the grafting knife half an inch below the bud; and while cutting, the knife blade is drawn in such a way that the end of the grafting knife will correspond with the end of the section, half an inch below the bud, when finished. This shield will be about $1\frac{1}{4}$ inches long, and as it will have a chipped edge, it is advisable to smooth it down, which will reduce it to about one inch. The scion-bud is then rather thick in the center and the ends are pointed bevels. The sap-wood of the shield does not knit, therefore it is advisable to diminish its surface.

Scion with Half Sap-wood.—This is far superior to the above. The cut is started in the same way (*a*, Fig. 10), but the knife is drawn parallel to the axis of the cane, as in *b*, Fig. 6. Drawing the blade out the transversal section *bb* (Fig. 10) is made cutting through the bark only.

The bud is seized between the thumb and first finger of the right hand and lifted (*c*) and pulled back (*d*). As the transverse cut only

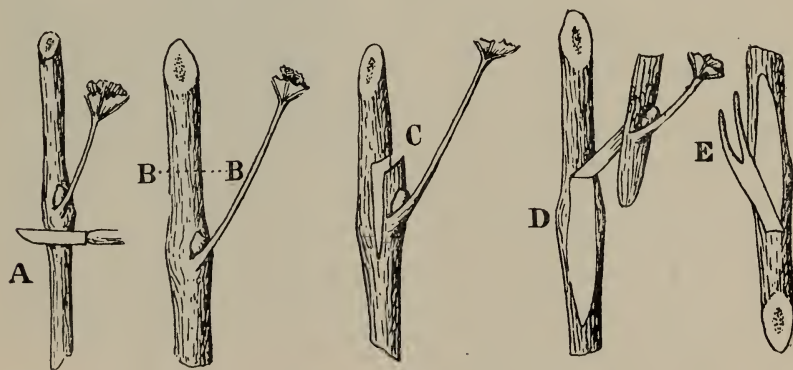


FIG. 10.

PREPARING A HALF SAP-WOOD SCION-BUD.

goes through the bark, in lifting the bud a tongue of sap-wood remains attached to the cane (*d*) and adheres to the scion-bud. When we lift this up it breaks off level with the bud, leaving a two-pronged fork (*e*, Fig. 10). If the fork is not formed, the bud should be

rejected, as it is not ripe enough. It is hard to explain this mode of operating, but it is really easy in practice.

Making the Slit on the Stock.—On one- or two-year-old canes, the slit should be made on the rounded part where the bark is thicker and will protect better against desiccation. However, if the scion-bud has a little sap-wood attached, it is better to place it on the flat side. On old wood the bark is so thin that it is almost impossible to lift it off.

Ligatures.—The best are made out of lead or tinfoil tied with raffia or cotton. The foil is cut into pieces three-quarters to one inch wide and two to three inches long.

Arrangement of Mother Stock.—All shoots of American stock may be readily budded; that is to say a person can place on a vigorous cane from ten to twenty buds and obtain the next season from one vigorous mother vine 100 to 150 grafted cuttings. Long experience has shown that to obtain these results it is necessary to arrange the stocks in the following manner:

Stakes about six or eight feet high are erected ten to fifteen feet apart. As soon as the shoots of the mother stock are about twenty inches in length, eight to twelve are preserved and the balance disbudded. The shoots are tied up in V-shape as soon as hard enough, all auxillary buds and tendrils being removed; this is repeated three times in the season. The even numbered shoots are tied up on one side and those of odd numbers on the other; this facilitates the budding and collecting of the knitted cuttings; twice the amount of wood fit to be budded is obtained in this way. On an experimental plot one hundred 4-year-old *Riparia* were trellised and as many left without trellising. The first gave an average of 175 feet, the latter 75 feet of wood suitable for budding.

Gathering and Keeping the Budded Cuttings.—We should wait until the leaves have fallen off before gathering the cuttings; they should be cut off on the spot; the whole cane should not be cut off and then the cuttings be removed later, as they are apt to be bruised if treated thus. As the cuttings are gathered, the eyes of the stock are removed, excising them with a grafting knife as closely as possible; those where the buds have missed may be kept to be bench-grafted the next spring. The good ones are placed in cases, in layers separated by fresh moss or moist straw. A lid is placed on the box and the cases are placed in a closed, dry, frost-proof room, and kept until planted. Then the boxes are taken out to the nursery, the cuttings taken out one by one, and their upper end freshened with a grafting knife (not shears), three-fourths to one inch being removed at each end. The cut end is then coated with tar.

